

# THE VIEW

Economic Research

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## AGING: A FOUNTAIN OF YOUTH FOR PRODUCTIVITY GROWTH

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## EXECUTIVE SUMMARY



Arne Holzhausen,  
Head of Insurance, Wealth and Trend Research  
[Arne.holzhausen@allianz.com](mailto:Arne.holzhausen@allianz.com)



Caroline Michler,  
Research Assistant  
[Caroline.michler@allianz.com](mailto:Caroline.michler@allianz.com)



Patricia Pelayo Romero,  
Expert Insurance Markets at Allianz SE  
[Patricia.pelayo-romero@allianz.com](mailto:Patricia.pelayo-romero@allianz.com)

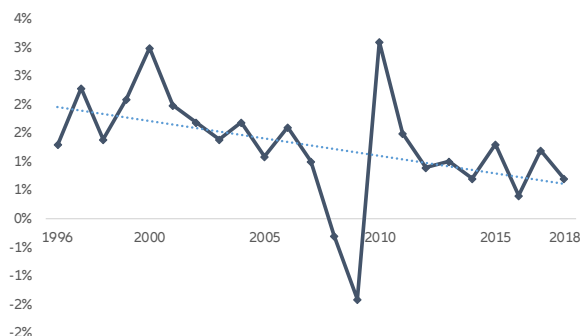
- Explanations abound for why almost all markets are plagued by declining productivity growth. But one often overlooked factor is the age structure of the workforce. Aging is usually associated with slower productivity growth but the U.S. experience shows that workers aged 40 to 49 are the most productive cohort. Their share in the workforce helped shape the U.S. productivity growth rate in the years between 1980 and 2000.
- With a panel data study, this paper examines whether similar trends are observable in Europe, too. The result: There is a statistically significant and positive correlation between the share of workers aged 40 to 49 and labor productivity. For Europe as a whole, a higher share of workers in their 30s and their 40s increases productivity growth by 16pp and 17pp, respectively, if we isolate the effect of aging.
- As a result, differing demographic trends could widen the gap between rich and poor countries in Europe. The demographic “winners” include Northern countries such as Germany, where the share of 40-somethings – today’s millennials – in the workforce is set to increase as the baby boomers retire. Denmark, Belgium, the Netherlands and the UK will see a similar trend. On the other hand, demographic headwinds could bring the productivity boom in Eastern Europe to an end, and Southern Europe, including Spain and Italy, could also see hindered productivity growth.

# 40-49

**THE AGE COHORT THAT DEFINES  
THE TRAJECTORY OF PRODUCTIVITY  
GROWTH.**

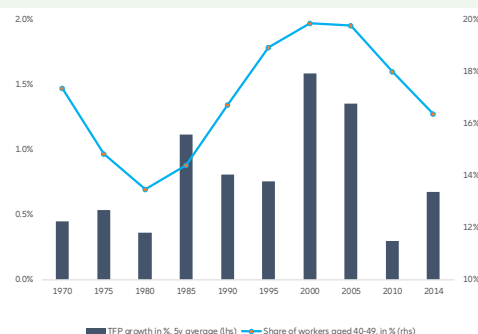
# THE PRODUCTIVITY PUZZLE

**Figure 1:** Real labor productivity per hour worked, EU 28, change in %, y/y



Sources: Eurostat, Allianz Research.

**Figure 2:** Total factor productivity (TFP) and demographics in the U.S.



Sources: Fed, ILO, Allianz Research.

“You can see the computer age everywhere but in the productivity statistics”  
(Robert Solow 1987)

We are living in times of massive technological change so you could be forgiven for thinking that the global economy is in the most digital and efficient period ever, and that today's workforce is the most productive. However, the growth rate of Europe's labor productivity per hour worked over the last decades (see Figure 1) suggests the opposite. If the rollercoaster-like development of the financial crisis and its aftermath are neglected, productivity has not picked up momentum in the past few years. On the contrary, the trend is clearly declining. Solow's famous remark seems as relevant today as in 1987.

Explanations for the downward trend in labor productivity abound<sup>1</sup>. They span from a slump in investments – lowering capital intensity – and globalized labor markets – subduing wage growth and hence lowering the rate of substitution of labor by capital – to rising market concentrations – hindering the diffusion of innovations. Another possible reason is simple measurement problems, which get a new twist

in the digital sphere: how can the progress made thanks to digitalization be measured if a large number of digital services are available free of charge? However, the key determinant that impacts labor productivity directly under the neoclassical model of economic growth is human capital, which itself is affected by factors such as the demographic structure, education and the business climate. In this context, aging is often associated with slower productivity growth. The argument goes that as prosperity rises, people become less keen on taking risks to protect the wealth they have already accumulated. This growing risk aversion of an aging society could slow down change and innovation. Therefore, an aging population is believed to threaten total factor productivity<sup>2</sup>. However, aging in and of itself is not a determinant of human capital. What matters is the age structure of the workforce. If different age cohorts differ in their productivity, then changes in the age distribution of a country's workforce will affect the average output per worker. The U.S. labor market is a case in point: the aging of the baby boomer cohort, whose peak birth year dates back to 1948, defined the devel-

opment of productivity growth. As the baby boomers began to enter the labor market in the seventies – pushing up the share of employees aged 20 to 29 and simultaneously lowering the share of workers aged 40 to 49 – a clear drop of productivity occurred (see Figure 2). This change accounted for an estimated 1.6pp decline in productivity growth between 1970 and 1980 (Feyrer 2002). But from 1980 onwards, as the baby boomers started to enter their forties, productivity growth increased. By the turn of the millennium, they were at their productive peak.

The most productive and innovative workers in the U.S. seem to be the ones aged between 40 and 49. The median innovator, for example, is aged 47. Moreover, most patents are filed by workers aged between 40 and 49 and this age bracket also shows the best adaptability to new technologies within the total workforce (Klein 2019).

Does this close relation between the age structure of the workforce and productivity growth also apply to European countries? Will Millennials restore Europe's labor productivity and secure prosperity?

<sup>1</sup> For a comprehensive overview see Heise, M., Holzhausen, A. & Schneider, R. (2015).

<sup>2</sup> An increase of the average age of the working population implies that aggregate productivity growth may deviate from the current age-specific rates (van Ewijk et al. 2006). Moreover, a concentration of the workforce into occupations in which productivity decreases with age reinforces the idea that productivity is age-dependent (IMF 2016).

# DEMOGRAPHIC CHANGE AND PRODUCTIVITY IN EUROPE

Labor productivity growth has slowed in almost all European countries over the last two decades as shown by Figure 1. Only Ireland and Spain managed to buck this trend, but for different reasons: In Ireland, a quirk in national accounts in 2015 gave an artificial boost to productivity growth, turning a slightly declining trend into a slightly increasing one. And in Spain, a short-lived productivity spurt after the financial crisis helped to lift the trend. Since then, however, productivity growth has continuously fallen again.

However, there is a clear East-West divide in terms of growth levels (see Figure 3). In Eastern Europe, productivity growth has been elevated in all countries, especially in the Baltic states and Romania, where the average growth rate topped +4%. Only Croatia and Hungary lagged slightly behind, but they were still well ahead of Western European countries. After the end of communism, the reintegration of these markets into European value chains implied huge inflows of investments and a positive technological shock. Even if only the last ten years are taken into account, most Eastern European countries still boast higher productivity growth than Western ones, though the differences have become smaller.

The only Western European country with comparably high productivity growth is Ireland, which has benefitted from its role as the preferred investment destination for American tech firms. Other Western European countries have mostly recorded lackluster growth rates below +1%; only Sweden fared a little better, with an average of +1.5% over the last two decades. At the bottom of the table are Luxembourg – its focus on finance bodes ill for productivity growth – and Italy: Here, productivity itself has in fact declined, the result of a permanent denial of the need for structural reforms. Surprisingly, in Germany, too, productivity growth has disappointed, mainly because of a relatively backward service sector. France performed slightly better than Germany. Overall, the differences between Western European countries are small and do not alter the general verdict: Productivity growth in Western Europe is a fiasco.

To test whether the changing age structure of the European workforce has an impact on this, we made a panel data study including the EU28 countries. We used data from Eurostat to allow our estimators to disengage the effect of un-observables within the countries, such as cultural differences and transitions in and out of states

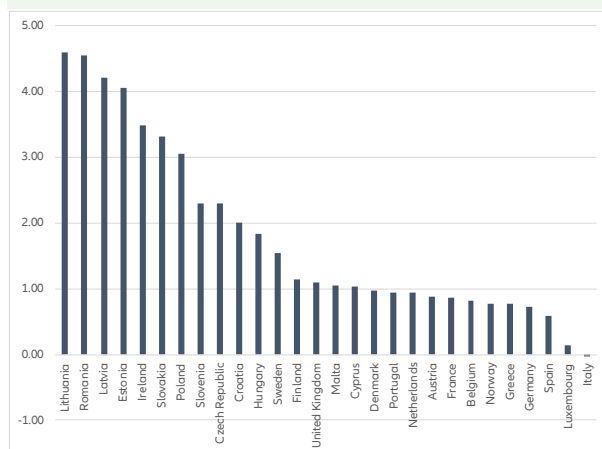
(poverty, workforce, etc.)<sup>3</sup>. We regressed the share of workers in their 40s, 30s and 20s on labor productivity, controlling for individual country characteristics for the years observed.

For Europe as a whole, our model yielded statistically significant results: A higher share of workers in their 30s and their 40s increases productivity growth by 16pp and 17pp, respectively, if we isolate the effect of aging. Of course, productivity paths differ from industry to industry and from job profile to job profile, so the channels through which the age structure of the workforce can affect productivity growth are manifold. Identifying them is beyond the scope of this paper. Our aim is simply to prove that age structures have an impact – which they clearly do.

<sup>3</sup> We used data from Eurostat regarding: productivity, economic growth, education levels and labor hours. These were combined with other datasets from other sources such as the UN Population Division and the World Bank to get a country characteristics time series. The data cover the EU 28 countries (except Bulgaria due to data quality) and the period from 1996 to 2018.



Photo by Val Vesa from Unsplash

**Figure 3:** Average growth of labor productivity 1996 – 2018, in %

Sources: Eurostat, Allianz Research

At a country level, the picture is a little murkier. For some of the countries in our sample, our model on workforce structure and aging was not significant. This was the case for Denmark, Luxembourg, Norway and Sweden, as well as Poland. For Poland, rapid technological advances might have overshadowed age-related factors; in Luxembourg, the monoculture of finance might have had a similar effect. For the three Scandinavian countries, other reasons like relatively stable demographics might have played a role.

However, for the overwhelming majority of countries, we could prove a statistically significant impact of age structures on productivity growth, albeit at different levels: gains in productivity by

a marginal increase in the share of workers aged 40-49 are not the same across the board. In Southern Europe, for example, namely Greece, Spain and Portugal, the impact is low, i.e. below 0.2pp; the same applies to Belgium, the Czech Republic, Estonia, the UK and the Netherlands. Meanwhile, France, Italy, Finland, Slovakia, Latvia and Switzerland show average gains in productivity, with an increase from 0.2 to 0.4pp if the share of workers aged 40-49 increases. However the countries that benefit the most, according to our estimations, are Hungary, Ireland, Germany, Austria and Slovenia, which show an increase of more than 0.4pp in their productivity growth.

To sum up: What Feyrer could show for

the US – the overwhelming impact of the share of 40-somethings in the workforce on productivity growth – is also observable in Europe: The age cohort of 40-49 defines to a certain degree the trajectory of productivity growth. This means productivity doesn't have to suffer because of a declining workforce or darkening economic prospects: If aging leads to a better age structure, i.e. a relatively higher share of workers aged 30 to 49, it could even improve.

The flip side is that some European countries are especially vulnerable if demographics turn less favorable.

# DEMOGRAPHIC DIVIDEND FOR PRODUCTIVITY GROWTH?

By combining our results with (reliable) demographic forecasts, we can chart the prospective growth rates of labor productivity in European countries.

The heat map (see Table 1) visualizes the forecasted demographic development divided into five-year intervals. Here, each value (x) has been calculated by adding the increase / decrease in

both the share of workers aged 30 to 39 as well as 40 to 49 in percentage points between five years intervals (2020-2025, 2025-2030, etc.). To avoid an “equalization effect” between the two shares (e.g. an increasing share of 30 to 39 and a decreasing share of 40 to 49 cancelling each other out) and to consider the higher correlation of workers in their forties, the percentage point

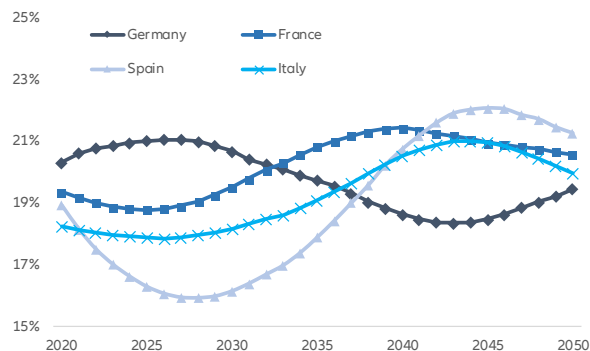
change of the age cohort 40 to 49 years has been rated with the factor 1.5 while the factor 1.0 has been assigned to workers in their thirties. The higher the final value, the higher the increase in the share of workers aged between 30 and 49, and hence the higher the positive impact on the growth rate of labor productivity in each country, and vice versa.

**Table 1:** Increase / decrease in the share of workers aged 30 to 49

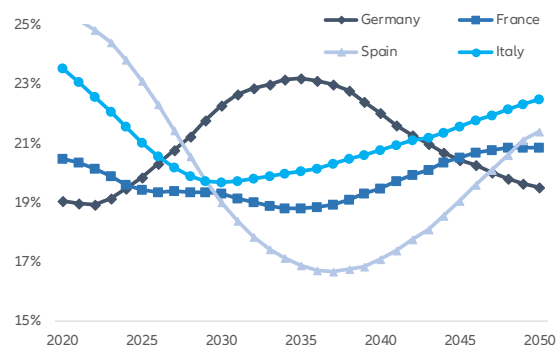
Country \ Years	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
Austria	1.4	2.8	0.7	-1.5	-3.1	-1.1
Belgium	0.2	0.7	0.2	0.0	-0.7	0.2
Croatia	1.2	0.1	-1.7	-0.1	0.2	-0.4
Cyprus	4.4	2.4	-1.5	-4.2	-4.0	-0.6
Czech Republic	-2.4	-6.8	-3.7	-1.5	0.6	4.6
Denmark	0.1	2.2	3.4	0.7	-3.1	-2.6
Estonia	3.0	-0.4	-1.7	-3.3	-3.7	0.7
Finland	2.8	0.4	-0.5	-1.0	-1.2	0.1
France	-2.2	0.5	0.6	1.7	1.1	0.1
Germany	1.9	3.2	0.5	-2.8	-2.6	-0.4
Greece	-3.5	-4.6	-2.3	2.7	3.9	3.2
Hungary	-0.9	-5.2	-0.9	-0.1	-0.9	0.6
Ireland	-3.7	-5.1	-4.2	0.6	4.7	4.6
Italy	-4.1	-1.7	1.5	2.5	1.6	0.3
Latvia	0.2	-1.8	-5.1	-6.3	-2.0	8.1
Lithuania	1.3	1.2	-1.1	-4.2	-4.2	3.3
Luxembourg	0.5	0.9	-0.3	-1.5	-1.9	-1.5
Malta	3.8	0.7	-2.3	-3.3	-3.3	-1.0
Netherlands	-0.3	2.9	3.1	0.6	-1.7	-2.0
Norway	-0.2	1.3	0.9	-0.3	-1.7	-1.0
Poland	3.2	-2.7	-6.0	-4.0	-1.6	3.0
Portugal	-3.2	-3.0	0.2	3.1	2.5	-0.2
Romania	-2.3	-4.2	-1.6	-2.5	1.3	2.0
Slovakia	1.3	-3.7	-4.4	-3.3	-0.9	2.2
Slovenia	-0.9	-3.6	-3.7	-1.2	2.5	3.4
Spain	-5.9	-6.3	-1.5	3.2	4.3	2.7
Sweden	0.7	0.2	0.5	-1.4	-2.2	1.0
United Kingdom	0.2	1.8	0.3	-0.1	-1.3	-0.6

x < -5
-3 > x > -5
-1 > x > -3
-1 > x > 0
0 < x < 1
1 < x < 3
3 < x < 5
x > 5

Sources: Eurostat, Allianz Research

**Figure 4: Share of workers aged 30 to 39 years**

Sources: Eurostat, Allianz Research

**Figure 5: Share of workers aged 40 to 49 years**

Sources: Eurostat, Allianz Research

Our results show that European countries' forecasted demographic developments are as diverse as their GDP, culture and languages. A glance at the heat map and Figures 4 and 5 illustrates that the demographic developments of the 27 examined European countries are too varied to allow a general prediction of Europe's productivity growth. And there is no country that will always be on the sunny side of demographics (although France and Belgium come close to this demographic wonderland).

Nonetheless, some patterns are emerging. The demographic "winners" can be found in the North of the continent. Germany, for example, is one of the countries experiencing demographic tailwinds, with higher expected productivity growth over the next decade due to the increasing share of workers aged 30 to 49. The looming retirement of the baby boomers creates the breathing space for the millennials to restore Germany's productivity growth, becoming the driving force of economic growth.

Equal positive effects of higher productivity growth are to be expected in Denmark, Belgium, the Netherlands, the

UK, Austria and the countries of the Scandinavian peninsula as they show similar positive demographic trends – an increasing share of workers aged 30 to 49. This demographic dividend, however, lasts only to the mid-2030s. In the second half of the forecasting period, up to 2050, most countries will face a diminishing share of workers in their most productive age, and thus might again be confronted with a decline in productivity growth.

France, too, can be counted as a member of the Northern club, although it will face some demographic headwinds until 2025. But for the rest of the forecast period, a gentle demographic tailwind will bolster productivity growth. Despite rather muted swings in the workforce structure, France (along with Belgium) is the only country in our sample which will bask most of the time in the demographic sun of an increasing share of workers aged between 30 and 49. This is the payback for relatively high fertility rates in the past.

On the other hand, the productivity boom in Eastern Europe may come to an end: Most countries in the East will face demographic headwinds in the

coming years. After a short period of grace, lasting up to 2025, the share of workers aged 30 to 49 will decrease sharply, depriving these countries of a main source for productivity growth. The Czech Republic and Romania are particularly likely to be hit hard. The decline in workers aged 30 to 49 could be further aggravated by ongoing migration to the West. As a result, a convergence of economic wellbeing between East and West may not be in the cards.

The same strong headwinds will also bedevil Ireland, the only Western European country with high productivity growth in the past. Southern Europe, too, shows pronounced demographic trends, which will hinder productivity growth in the coming years. This "prediction" of a continuous downward spiral in Southern Europe's productivity growth bodes badly for closing the prosperity gap with the Northern part of the continent. The more distant future does look a little brighter: Italy, Spain, Portugal and Greece will all have to wait until the 2030s for demographics to start supporting productivity growth.

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Director of Publications: Ludovic Subran, Chief Economist  
Euler Hermes Allianz Economic Research  
1, place des Saisons | 92048 Paris-La-Défense Cedex | France  
Phone +33 1 84 11 35 64 |  
A company of Allianz

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[research@eulerhermes.com](mailto:research@eulerhermes.com)



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